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KANDUNGAN

KATA-KATA ALUAN PENAUNG

Assalamualaikum Warahmatullahi Wabarakatuh

Tahniah diucapkan kepada Jawatankuasa Jurnal Akademik UiTM Cawangan Kedah khasnya dan warga akademik UiTM Cawangan Kedah amnya kerana telah berjaya menerbitkan penerbitan pertama WAHANA AKADEMIK iaitu Jurnal Akademik UiTM Cawangan Kedah. Usaha ini adalah sejajar dengan cabaran era globalisasi yang memerlukan keupayaan penguasaan dalam pelbagai bidang ilmu. Masyarakat yang tidak mempunyai ilmu akan terus ketinggalan dan terkebelakang dalam segala segi. Sebagai sebuah universiti, para pensyarah dapat memainkan peranan yang penting dalam menghadapi cabaran ini kerana ilmu yang diturunkan dalam bentuk penulisan dapat mengubah nasib sesebuah masyarakat. Oleh itu para pensyarah perlulah berusaha untuk melengkapkan diri dengan meningkatkan pengetahuan tentang bidang masing-masing serta komited dengan penulisan dan penerbitan.

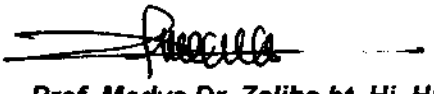
Saya amat berharap kewujudan jurnal WAHANA AKADEMIK akan menjadi pemacu kepada percambahan dan pertumbuhan ilmu serta menjadi saluran utama kepada penerbitan pensyarah UiTM khasnya UiTM Cawangan Kedah.

Saya juga berharap penerbitan jurnal ini dapat dimanafaatkan oleh semua warga kampus UiTM khasnya dan masyarakat amnya dalam usaha untuk memperbanyakkan lagi khazanah ilmu.

Akhir kata, saya sekali lagi mengucapkan setinggi-tinggi penghargaan dan syabas di atas kejayaan menerbitkan WAHANA AKADEMIK.

Sekian. Terima kasih.

Wassalam.



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KATA-KATA ALUAN PENASIHAT

Assalamualaikum Warahmatullahi Wabarakatuh

Saya mengambil kesempatan ini untuk merakamkan ucapan terima kasih kepada Jawatankuasa Jurnal Akademik Universiti Teknologi MARA Cawangan Kedah di atas usaha menerbitkan WAHANA AKADEMIK. Penerbitan jurnal ini adalah selaras dengan aspirasi negara yang mahukan setiap rakyatnya mempunyai ilmu pengetahuan.

Kegiatan penulisan dalam pembentukan profesyen seorang pensyarah di institusi pengajian tinggi adalah sangat penting. Ini adalah kerana dengan melibatkan diri di dalam penulisan akademik, pensyarah dapat menunjukkan bahawa ia sentiasa berusaha untuk melengkapkan diri dan berkemampuan untuk meningkatkan ilmu pengetahuan sesuai dengan tarafnya sebagai seorang ahli akademik. Walau pun sibuk dengan beban pengajaran yang banyak, tetapi pensyarah tidak wajar menjadikannya sebagai alasan untuk tidak terlibat dalam bidang penulisan. Oleh itu, saya menyeru agar pensyarah sekelian berusaha menjadikan penulisan sebagai satu budaya serta memainkan peranan dengan sebaik-baiknya bagi menyempurnakan kegiatan yang berfaedah ini.

Saya juga berharap agar pensyarah menggunakan peluang untuk mendalami ilmu, mengemukakan pendapat dan seterusnya menyebarkan pengetahuan melalui ruang yang disediakan oleh WAHANA AKADEMIK ini dengan sebaik mungkin. Sesungguhnya penerbitan jurnal ini merupakan satu mekanisma yang dapat mempertingkatkan status akademik pensyarah UiTM Cawangan Kedah di mata masyarakat.

Sekian. Semoga segala usaha dan sumbangan bakti Jawatankuasa tuan/puan semua diberkati Allah S.W.T.

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DARI KETUA PENYUNTING

Assalamualaikum Warahmatullahi Wabarakatuh

Syukur kepada Allah kerana penerbitan pertama 'WAHANA AKADEMIK,' iaitu jurnal akademik pertama Universiti Teknologi MARA Cawangan Kedah akhirnya dapat diterbitkan. Usaha untuk menerbitkan jurnal ini lahir daripada kesedaran bahawa budaya penulisan perlu dipupuk di kalangan ahli akademik. 'Wahana' yang bermakna alat untuk melahirkan atau menyampaikan fikiran atau pendapat diharap akan dapat dimanafaatkan oleh ahli akademik dalam usaha untuk menyalur dan berkongsi maklumat mengenai perkembangan pelbagai bidang akademik kepada pembaca.

Semua pihak dialu-alukan untuk mengemukakan karya penulisan dan penyelidikan yang belum pernah diterbitkan untuk dimuatkan di dalam jurnal ini. Penulisan boleh dibuat dalam bentuk karya asal penyelidikan, kajian kes, ulasan artikel, pendapat dan lain-lain bentuk penulisan akademik daripada berbagai disiplin pengajian.

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Wan Faizah bt. Wan Abdullah

CAPITAL BUDGETING IN INVESTMENT AND PROJECT APPRAISAL

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ABSTRACT

This article critically evaluates the relative attractions of the Net Present Value (NPV) method in capital budgeting. The author argues for the NPV method over the Internal Rate of Return (IRR) method. The implications of inflation for investment appraisal are discussed in the later part of this article. The author opines that in capital budgeting, particularly for projects with a long life, the inflation factor cannot be ignored.

Keywords: ***Capital Budgeting, Discounted Cash Flow, Inflation, Internal Rate Return, Investment Appraisal, Net Present Value***

Various methods are used to evaluate and compare investment projects. Basically they are of two types: the discounted cash flow (DCF) methods and the non-discounted cash flow methods. Peirson, Bird, Brown and Howard (1995) mention that surveys of business practice suggest two are most frequently employed. They are the net present value (NPV) and the internal rate of return (IRR). Both are DCF methods, which discount the estimated cash flows to allow for the magnitude, timing, and risk of the cash flows.

The NPV of a project is obtained by discounting the project's future cash flows at the required rate of return and then deducting from the resulting present value, the initial outlay on the project. Thus it can be written as:

$$\text{NPV} = \frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \ldots\ldots + \frac{C_n}{(1+k)^n} - C_0$$

or more conveniently as:

$$\text{NPV} = \sum_{t=1}^{n} \frac{C_t}{(1+k)^t} - C_0$$

where, C_0 = initial cash outlay on the project
C_t = net cash flow generated by the project at time t
n = the life of the project
k = required rate of return

A positive NPV means that the investment increases the value of the firm where the return is more than sufficient to compensate for the required return on the investment. A negative NPV would mean otherwise. A zero NPV means that the return just equals the return required by owners to compensate them for the degree of uncertainty of the investment's future cash flows and the time value of money. Thus, the NPV technique works on a simple but fundamental principle. An investment is worthwhile undertaking if the cash flows got out of the investment are at least equal to if not greater than the cash flows put in.

The following is an example extracted and adapted from Peterson (1994) to illustrate the NPV decision rule. Each project requires an initial cash outlay of RM1 million at the end of the year 2000 and has a cost of capital of 10 percent per year.

Table 1: Net Present Value Decision Rule

	Investment A		Investment B	
End of year	Cash flow	Value at end of 2000	Cash flow	Value at end of 2000
2000	-1 000 000	-1 000 000	-1 000 000	-1 000 000
2001	400 000	363 636	100 000	90 909
2002	400 000	330 579	100 000	82 645
2003	400 000	300 526	100 000	75 131
2004	400 000	273 206	1 000 000	683 013
2005	400 000	248 369	1 000 000	620 921
		NPV 516 315		NPV 552 619

Source: Adapted from Peterson (1994)

The two NPVs show that Investment A increases the value of the firm by RM516 315 while Investment B increases the value of the firm by RM552 619. If both are independent investments, they should be taken on because they increase the value of the firm. If both are mutually exclusive where the choice is either but not both, then Investment B is preferred under NPV decision rule.

A project's IRR is the rate of return, which equates the present value of its net cash flows generated with its initial cash outlay. The IRR is also the discount rate that results in zero NPV. The IRR is obtained by solving for r in the following equation:

$$C_0 = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \ldots\ldots + \frac{C_n}{(1+r)^n}$$

or more conveniently in:

$$C_0 = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t}$$

where, C_0 = initial cash outlay on the project
C_t = net cash flow generated by the project at time t
n = the life of the project
r = internal rate of return

The decision rule for the IRR is to invest in a project if it provides a return greater than the cost of capital. In the context of the IRR, the cost of capital is a hurdle rate or the minimum acceptable rate of return. The IRR is a yield or what is earned, on average per year from the project. The related IRRs of Investment A and Investment B are given below:

Table 2: Internal Rate of Return Decision Rule

	IRR per year	Cost of capital per year
Investment A	28.65 %	10 %
Investment B	22.79 %	10 %

Source: Adapted from Peterson (1994)

Both investments are attractive for similar risk investments where owners earn 10 percent per year. They yield more than the rate owners require for the level of risk of these two investments.

If as stated earlier, the investments were mutually exclusive where accepting one precludes the acceptance of the other, Investment A with a higher IRR would be accepted under IRR decision rule. But then, this decision would contradict the decision taken under NPV decision rule. The superiority of NPV decision rule over IRR decision rule will be known by making comparison under conditions of different costs of capital. The IRRs would remain the same while the NPVs would change with the cost of capital or the required rate of return.

Table 3: Comparison Between Internal Rate of Return and Net Present Value

	IRR per year	NPV at 10 % cost of capital per year	NPV at 25 % cost of capital per year
Investment A	28.65 %	RM 516 315	RM 75 712
Investment B	22.79 %	RM 552 619	RM -67 520

Source: Adapted from Peterson (1994)

Investment A still has a positive NPV, since its IRR is greater than 25 percent but Investment B has a negative NPV as its IRR is less than 25 percent. Peterson (1994) had this to add. When evaluating mutually exclusive projects, the one with the highest IRR may not be the one with the best NPV. The IRR may point to a different decision because of different reinvestment assumption. The NPV assumes cash flows are reinvested at the cost of capital while the IRR assumes cash flows are reinvested at the internal rate of return.

According to Peterson (1994), these assumptions may lead to different decisions in choosing among mutually exclusive projects when certain factors apply. These factors are the timing of the cash flows is different among the projects, the very different cash flows amounts or scale differences and the projects having different useful lives. It is clear that the cash flows of Investment A are received sooner and part of the subsequent return may be from the reinvestment of its cash flows. Hence, we may be overstating the return on the investment using IRR for projects with an IRR above the cost of capital. Thus, if we evaluate projects on the basis of their IRR, we may select one that does not maximise value.

Peterson (1994) added that the IRR method could forecast the maximisation of wealth so long as two conditions are met. The projects should be independent and they are not limited by capital rationing. On the other hand, NPV is consistent with owners' wealth maximisation. This is because NPV is a measure of how much owners' wealth is expected to increase with an investment. It helps to identify projects that maximise owners' wealth.

Another area where the NPV method is superior over IRR method is when the risk of cash flows is considered. To get a clear exposition, Peterson's hypothetical Investment G and Investment H (1994) is extracted and adapted as Investment C and Investment D below:

Table 4: Net Present Value for Investment C and Investment D

	Investment C		Investment D	
End of year	Cash flow	Value at end of 2000	Cash flow	Value at end of 2000
2000	-1 000 000	-1 000 000	-1 000 000	-1 000 000
2001	250 000	238 095	250 000	227 273
2002	250 000	226 757	250 000	206 612
2003	250 000	215 959	250 000	187 829
2004	250 000	205 676	250 000	170 753
2005	250 000	195 882	250 000	155 230
		NPV 82 369		NPV -52 303

Source: Adapted from Peterson (1994: 403)

Although both have identical cash flows, the cash inflows of Investment D are riskier. Hence, the cost of capital of Investment D is set higher at 10 percent compared with 5 percent for Investment C. Investment C is accepted, since it is expected to increase owners' wealth. As for Investment D, it is rejected because it is expected to decrease owners' wealth. Therefore, the NPV method is able to distinguish among investments whose cash flows have different risks.

Both Investment C and Investment D have similar cash flows. So when considered under the IRR method, both would result in similar IRR figures. To be precise, the IRR for both are 7.93 percent. Investment C is accepted on the grounds that its IRR exceeds the cost of capital while Investment D is rejected because its IRR is lower than the cost of capital. Thus, the

calculation of IRR doesn't consider risk but with the NPVs of the projects the risk of the cash flows is given due consideration.

Nevertheless, there are a couple of things that need to be given due consideration when applying the NPV. Under the NPV method of evaluation, the incremental value to owners' wealth is stated in absolute money amount. On the other hand, investors and managers tend to visualise gains in terms of percentage points. In addition, the cost of capital needs to be known to calculate the NPV. The cost of capital is the compensation for the time value of money and the risk of not receiving future cash flows as promised. Although its concept is simple, estimating the cost of capital is easier said than done.

To sum up, below are two charts reproduced from Peterson's Table 9-3 (1994) outlining the advantages and disadvantages of both the NPV and IRR evaluation techniques.

Net Present Value

Advantages	Disadvantages
1. Tells whether investment will increase the firm's value.	1. Requires estimate of cost of capital in order to calculate.
2. Considers all cash flows.	2. Expressed in terms of absolute money, not as a percentage.
3. Considers the time value of money.	
4. Considers the risk of future cash flows.	

Internal Rate of Return

Advantages	Disadvantages
1. Tells whether investment will increase the firm's value.	1. Requires estimate of cost of capital in order to calculate.
2. Considers all cash flows.	2. May not give value-maximising decisions when used to compare mutually exclusive projects.
3. Considers the time value of money.	3. May not give value-maximising decisions when used to choose projects with capital rationing.
4. Considers the risk of future cash flows.	

Overall, many authors seem to favour the NPV method over the IRR method as the capital budgeting approach. Schall and Haley (1991) say any problem that can be treated with IRR can also be analysed using present value, whereas the reverse is not the case. As for Peirson, Bird, Brown, and Howard (1995), they mention that the NPV method is simpler and more obviously consistent with the objectives of wealth maximisation. Davis and Pointon (1985) say that IRR is merely a relative measure of wealth, whereas the NPV method is the correct approach based upon the maximisation of absolute shareholders' wealth.

Lumby (1994) points out that the presence of inflation whether expected or unexpected is likely to cause problems for investment appraisal. First, the

estimation of a project's expected cash flows is going to be made more difficult. The expected future rates of inflation need to be estimated as well. Secondly, the rates of return representing the price of money, like any other prices can be expected to rise with inflation. There is then the additional task of estimating the effects of inflation on the project's appraisal discount rate. Thus, the presence of inflation will cause forecasting problem.

Davis and Pointon (1985) mention that it is absolutely essential to consider the effects of inflation on the relevant cash flows of a project. Otherwise the cash flows may be incorrectly evaluated. In practice, the rates of inflation are unlikely to be known with any degree of certainty. Peirson, Bird, Brown, and Howard (1995) state that there are two approaches to incorporate the effects of inflation into project evaluation. Each approach deals with the effect of inflation by either expressing and working with the variables in nominal or real terms. Both approaches when applied consistently will give the same NPV.

The first approach involves making estimates of cash flows that are based on anticipated prices during each year of a project's life. These cash flows are then discounted at the nominal cost of capital. The estimated net cash flows in a particular year will then be based on the prices expected in that particular year. The use of nominal cost of capital means that the discount rate reflects the market's expectations about the rate of inflation. Therefore, the observed nominal rates of return have built into them the expected future inflation rates.

The second approach involves estimating the net cash flows without adjusting them for anticipated changes in prices. These cash flows are then discounted at the real cost of capital. The net cash flows are estimated using existing constant prices. To be consistent, it is necessary to discount these net cash flows at the real cost of capital to exclude the effect of price rises on the project values. Both approaches should yield the same results except for some minor rounding off discrepancies.

Below is an example extracted and adapted from Peirson, Bird, Brown, and Howard (1995) to show how the effects of inflation can be taken into consideration in project evaluation under both approaches. Here, it is assumed that an investment of RM1000 is expected to generate cash flows of RM500, at constant prices, at the end of each year for 3 years. Prices are expected to rise at the rate of 10 percent per annum. The nominal cost of capital is set at 15 percent per annum.

Using the first approach, the NPV of the investment is calculated as:

$$\text{NPV} = -1000 + \frac{500(1.10)}{1.15} + \frac{500(1.10)^2}{(1.15)^2} + \frac{500(1.10)^3}{(1.15)^3}$$

$$= -1000 + \frac{550}{1.15} + \frac{605}{1.3225} + \frac{665}{1.5209}$$

$$= \text{RM}373$$

Using the second approach, the real cost of capital needs to be calculated first. It is calculated as:

$$i^* = \frac{1+i}{1+p} - 1$$

where, i^* = real rate of return per annum
i = nominal rate of return per annum
p = anticipated rate of inflation per annum

thus, $i^* = 4.55$

$$\text{NPV} = -1000 + \frac{500}{1.0455} + \frac{500}{(1.0455)^2} + \frac{500}{(1.0455)^3}$$

$$= -1000 + \frac{500}{1.0455} + \frac{500}{1.0931} + \frac{500}{1.1428}$$

= RM373

The first approach, which incorporates the effect of inflation into project evaluation, is generally more widely adopted. Different rates of change in prices for different components of a project's cash flows can be readily incorporated and applied. For instance, the rate of change in wage rates may be forecast differently from the rate of change in inventory prices. Apart from that, the complexity of the relationship between real and nominal rates of return makes the earlier approach much easier to handle.

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